ENTERTAINMENT MACHINE USING BIOMETRIC INFORMATION

BACKGROUND OF INVENTION

Biometric information generally refers to biological, physiological, and/or behavioral traits or characteristics of individuals. Such traits or characteristics may include, but are not limited to: irises, retinas, fingerprints, faces, hand geometries, handwriting, veins, and voices (e.g., speech). Biometric information has received wide attention with respect to security applications. Biometric information may be used for identification purposes and for authentication purposes. For authentication purposes, a person's biometric information may be scanned and compared to previously scanned and stored biometric information of this person, to determine if the person is who he or she claims to be. For identification purposes, a person's biometric information may be scanned and compared to previously stored biometric information of a large number of people – including that of the person – to determine who the person is.

SUMMARY OF THE INVENTION

The invention, by comparison, relates to an entertainment machine using biometric information. In one embodiment, the entertainment machine detects biometric information of a customer. The biometric information of the customer is compared against a database of biometric information of a number of predetermined people other than the customer, to yield one or more people having biometric information that most closely match the biometric information of the customer. These predetermined people may be famous people, such as sports stars, movie stars, public figures, and even

fictitious persons. The entertainment machine indicates to the customer the identities of the people having biometric information that most closely match that of the customer.

The entertainment machine may thus be employ in public settings such as bar, restaurants, shopping malls, public plazas, airports, and so on. In exchange for money, such as a dollar, a person can learn for entertainment purposes what famous person, for instance, he or she most closely matches biometrically. People may be interested to learn, for example, what sports stars their faces most closely resemble, or the movie stars who have hand geometries most similar to them. Still other aspects, embodiments, and advantages of the invention will become apparent by reading the detailed description that follows, and by referring to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

The drawings referenced herein form a part of the specification. Features shown in the drawing are meant as illustrative of only some embodiments of the invention, and not of all embodiments of the invention, unless otherwise explicitly indicated.

FIG. 1 is a flowchart of a method that may be performed by an entertainment machine, to determine the predetermined people who have biometric information that most closely match the biometric information of a customer, according to an embodiment of the invention.

FIG. 2 is a flowchart of a method that may be performed by an entertainment machine, to determine how closely the biometric information of one customer and the biometric information of another customer match, according to an embodiment of the invention.

FIG. 3 is a diagram of a perspective view of an example entertainment machine using biometric information, and may perform the method of FIG. 1 or 2, according to a specific embodiment of the invention.

FIG. 4 is a block diagram of an entertainment machine using biometric information, which may perform the method of FIG. 1 or 2, and that is consistent with but more general than the entertainment machine of FIG. 3, according to an embodiment of the invention.

DETAILED DESCRIPTION OF THE DRAWINGS

In the following detailed description of exemplary embodiments of the invention, reference is made to the accompanying drawings that form a part hereof, and in which is shown by way of illustration specific exemplary embodiments in which the invention may be practiced. These embodiments are described in sufficient detail to enable those skilled in the art to practice the invention. Other embodiments may be utilized, and logical, mechanical, and other changes may be made without departing from the spirit or scope of the present invention. The following detailed description is, therefore, not to be taken in a limiting sense, and the scope of the present invention is defined only by the appended claims.

Determining other people who most closely match customer

FIG. 1 shows a method 100 for determining other people that have biometric information that most closely matches the biometric information of a customer, according to an embodiment of the invention. The method 100 can be performed by an entertainment machine, embodiments of which are described in a subsequent section of

the detailed description. The method 100 is intended for entertainment purposes, as opposed to security and other purposes. As such, the accuracy in determining the other people who most closely match the customer is not critical, and may be a subservient goal than to provide entertainment to customers.

The biometric information of a customer is detected by an entertainment machine (102). Detecting the biometric information is inclusive of obtaining, acquiring, scanning, and capturing such information. The biometric information that is detected may include facial images of the customer, voice samples of the customer, fingerprint scans of the customer, handprint scans of the customer, and/or retinal or other eye scans of the customer, among other types of biometric information. Furthermore, the method 100 may operate in more than one modality, or just one modality. For example, the method 100 may capture just facial images of the customer as the biometric information, or it may capture facial images of the customer and also voice samples, and so on.

The biometric information of the customer is compared against a database of biometric information of people other than the customer, to yield one or more people having biometric information that most closely matches biometric information of the customer (104). The database information of the biometric information of people other than the customer includes at least the same type or modality of biometric information that was detected with respect to the customer in 102. For example, if facial images of the customer are captured in 102, then the database includes at least facial images of people other than the customer. Importantly, the database preferably does not include biometric information of the customer him or herself. This is because the goal is not identification of the customer – i.e., determining the customer's identity – but rather for

amusement and entertainment to indicate to the customer other people that have similar biometric information as that of the customer.

The people are preferably famous individuals, such as sports stars, celebrities, politicians, and historical figures. Furthermore, the people may be fictitious persons or characters, such as popular cartoon characters. The intention in one embodiment of the invention is to have the biometric information of people with which typical customers are likely to be familiar. Thus, yielding one or more people from the database who have biometric information that most closely match the biometric information of the customer is entertaining for the customer. For instance, the customer can learn whom he or she "looks like" or "sounds like," as determined biometrically. The database is preferably upgradeable, so that the biometric information of new persons can be added to, and the biometric information of existing persons may be removed from, the database as needed.

In one embodiment, the manner by which the biometric information of the customer is compared against the biometric information of each person within the database is accomplished as is known within the art, such as by using known approaches and algorithms. For instance, the comparison of the customer's biometric information against the biometric information of each person may yield a numerical similarity value with respect to that person. Once such a comparison has been accomplished for each person within the database, a predetermined static or dynamic number of people having the highest numerical similarity values, and/or the people having numerical similarity values greater than a predetermined threshold, are identified as the people having biometric information that most closely matches the biometric information of the customer.

Furthermore, the customer may be requested to provide additional information about him or herself, to better guide the comparison in 104, and thus to provide maximum entertainment value for the customer. For instance, the gender and age range of the customer may be requested, and only the biometric information of those persons in the database having the same gender and age range considered as potential candidates that most closely match the customer. This can avoid scenarios where the closest matches for a male customer are all women, for instance, which may be embarrassing to the customer and decrease the entertainment machine's entertainment value for the customer, lessening its usage by other customers.

The identities of the people having biometric information that most closely matches the biometric information of the customer are then indicated to the customer by the entertainment machine (106). For example, pictures of these people, and/or their names, may be displayed on a display device that is part of the entertainment machine. As another example, a hardcopy of the pictures of the people, and/or their names, may be printed by a printing device that is part of the entertainment machine. Additional information, such as short biographical summaries of the people that biometrically most closely match the customer, may also be provided, just in case, for instance, the customer is unfamiliar with the people to whom he or she most closely resembles biometrically.

Furthermore, prizes and/or awards may be provided for customers based on different criteria in accordance with how closely they match predetermined people. For instance, the closest match to date of a customer to any person may cause the customer to receive an award, the closest match to date of a customer to a given predetermined person may cause the customer to receive an award, and so on. As an additional example, the

customer matching any person or a given person by more than a threshold may cause the customer to receive an award.

Determining how closely two customers match

FIG. 2 shows a method 200 for determining how closely the biometric information of two customers match, according to an embodiment of the invention. The method 200 can be performed by an entertainment machine, embodiments of which are described in the next section of the detailed description. Like the method 100 of FIG. 1, the method 200 is intended for entertainment purposes, as opposed to security and other purposes. As such, the accuracy in determining how closely the biometric information of two customers match is not critical, and may be a subservient goal than to provide entertainment to customers.

The biometric information of a first customer is detected by an entertainment machine (202), and the biometric information of a second customer is detected by the entertainment machine (204). As before, detecting the biometric information is inclusive of obtaining, acquiring, scanning, and capturing such information. The biometric information that is detected may include facial images, voice samples, fingerprint scans, handprint scans, and/or retinal or other eye scans, among other types of biometric information. Furthermore, more than one modality of biometric information may be detected, or just one modality may be detected. For instance, just the facial images of the two customers may be detected, or the facial images and voice samples of the two customers may both be detected.

How closely the biometric information of the first customer and the biometric information of the second customer match is then determined (206). In one embodiment,

the manner by which how closely the biometric information of the first and the second customers match is determined may be accomplished as is known within the art, such as by using known approaches or algorithms. For instance, the biometric information of the first customer may be compared to the biometric information of the second customer, to yield a numerical similarity value of the biometric information of the first customer with respect to that of the second person. Such a numerical similarity value may be normalized and expressed as a "percentage likeness." For instance, if the range of numerical similarity values is on a linear scale between 15 and 150, a value of 117 be normalized to (117 – 15) / (150 – 15) = 76%. Other approaches and algorithms may also be employed, however.

How closely the biometric information of the first customer and the biometric information of the second customer match is finally indicated to the customers by the entertainment machine (208). For example, the similarity value previously determined may be displayed on a display device that is part of the entertainment machine, or a hardcopy thereof may be printed by a printing device that is part of the entertainment machine. The biometric information of the customers that was captured, where this information is visually oriented, such as handprints or facial images, may also be displayed on the display device, or printed on the hardcopy by the printing device.

Furthermore, prizes and/or awards may be provided for the first and the second customers based on different criteria in accordance with how closely they match one another. For instance, the closest match to date of two customers may cause them to receive an award. As an additional example, the matching of the two customers by more than a threshold may cause them to receive an award.

Entertainment machine

FIG. 3 shows a perspective view of an example entertainment machine 300, according to a specific embodiment of the invention, which may be capable of performing the method 100 of FIG. 1 and/or method 200 of FIG. 2. The entertainment machine 300 has a housing 302, the form factor of which may be comparable to modern arcade games and suitable for placement in hotel lobbies, bars, restaurants, airports, and other public places. Disposed within the housing are a video display 304, a camera 306, a button 308, and a currency bill acceptor slot 310.

The video display 304 may be a cathode-ray tube (CRT) display device in one embodiment of the invention. The camera 306 is a specific example of a biometric acquisition mechanism, which may be used to capture facial images of customers as one type of biometric information. Once a customer has inserted a dollar bill, or another amount of currency, into the currency bill acceptor slot 310, the customer is able to press the button 308 to start the method 100 of FIG. 1 or the method 200 of FIG. 2. Instructions are provided to the customer on the video display 304, and the results of the method 100 or the method 200 are also provided to the customer on the display 304.

FIG. 4 shows a block diagram of the entertainment machine 300 that is more general than but consistent with the embodiment of the entertainment machine of FIG. 3, according to an embodiment of the invention. The entertainment machine 300 of FIG. 4 includes a biometric acquisition mechanism 406, a computer-readable medium 408, a comparison mechanism 402, an output mechanism 404, and a credit-accepting mechanism 410. As can be appreciated by those of ordinary skill within the art, the machine 300 may include other components in addition to and/or in lieu of those depicted

in FIG. 4. For example, the machine 300 may include one or more controls, such as the button 308 of FIG. 3, to start the comparison process, and/or to select which mode the machine 300 is to operate in where the machine 300 is able to perform both the method 100 of FIG. 1 as well as the method 200 of FIG. 2.

The biometric acquisition mechanism 406, of which the camera 306 of FIG. 3 is a specific example or type, obtains biometric information of customers where the entertainment machine 300 performs the method 100 of FIG. 1 or the method 200 of FIG. 2. The mechanism 406 may be or include an image-capturing mechanism, such as the camera 306, to capture facial images, retinal scans, and/or eye scans of customers. The mechanism 406 may be or also include a sound-recording mechanism to record voice samples of customers, a touch-sensitive mechanism to obtain fingerprint scans and/or handprint scans of customers, as well as other types of biometric acquisition mechanisms.

The computer-readable medium 408 has stored thereon a database of information of predetermined people where the entertainment machine 300 performs the method 100. The medium 408 may include fixed and/or removable media, volatile and/or non-volatile media, and/or semiconductor, magnetic, and/or optical media, as well as other types of media. The medium 408 may in one embodiment include fixed semiconductor volatile media, such as dynamic random-access memory (DRAM), from which computer programs are run. The medium 408 may in one embodiment include fixed magnetic non-volatile media, such as a hard disk drive, where such computer programs, and where data for the computer programs, are permanently stored. The medium 408 may further include in one embodiment removable magnetic non-volatile media, such as floppy disks, as well as removable optical non-volatile media, such as optical discs.

The comparison mechanism 402 may include hardware, such as processors and other types of hardware, software, such as computer programs, or a combination of hardware and software, and may be field or remotely upgradeable, such as over the Internet. The mechanism 402 in the method 100 of FIG. 1 is to compare the biometric information of a customer against the database of biometric information of predetermined people to yield one or more people having biometric information that most closely matches the biometric information of the customer. In the method 200 of FIG. 2, the mechanism 402 is to determine how close the biometric information of a first customer matches the biometric information of a second customer. The comparison mechanism 402, and hence the entertainment machine 300 of which it is a part, may further be able to perform both the functionality of the method 100 as well as the functionality of the method 200, in one embodiment of the invention.

The output mechanism 404 may include display devices, such as the video display 304 of FIG. 3. That is, the mechanism 404 may be or include CRT display device, flat-panel display (FPD) devices, liquid crystal display (LCD) devices, plasma display devices, as well as other types of display devices. Furthermore, the output mechanism 404 may include printing devices, such as inkjet-printing devices and laser-printing devices. The mechanism 404 in the method 100 of FIG. 1 is to indicate to the customer the people having biometric information that most closely matches the biometric information of the customer. The mechanism 404 in the method 200 of FIG. 2 is to indicate to the first and the second customers how closely the biometric information of the first customer matches the biometric information of the second customer.

Finally, the credit-accepting mechanism 410 is to accept cash-oriented credit, such as bills of currency, coins, tokens, credit cards, charge cards, debit cards, value-representing cards or pieces of paper, and so on, from customers, so that obtaining the biometric information of the customers can be initiated in furtherance of the method 100 of FIG. 1 or the method 200 of FIG. 2. As such, the mechanism 410 may include the currency bill acceptor slot 310 of FIG. 3. The mechanism 410 may automatically initiate performance of the method 100 or the method 200 once proper cash or credit has been inserted thereinto, or may indicate that a control, such as the button 308 of FIG. 3, may be pressed to initiate such performance once proper cash or credit has been inserted thereinto. Alternatively, the mechanism 410 may, upon proper cash or credit having been inserted thereinto, indicate that one of two modes corresponding to the methods 100 and 200 may be selected and started by the customers.

Conclusion

It is noted that, although specific embodiments have been illustrated and described herein, it will be appreciated by those of ordinary skill in the art that any arrangement calculated to achieve the same purpose may be substituted for the specific embodiments shown. This application is intended to cover any adaptations or variations of the disclosed embodiments of the present invention. Therefore, it is manifestly intended that this invention be limited only by the claims and equivalents thereof.